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I, LEANNE MYNOTT, TEAM LEADER EXAMINATION SUPPORT AND SALES hereby certify that annexed is a true copy of the Provisional specification in connection with Application No. PP 8490 for a patent by BRITAX RAINSFORDS PTY LTD filed on 05 February 1999.

WITNESS my hand this
Third day of March 2000

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TEAM LEADER EXAMINATION
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BRITAX RAINSFORDS PTY LTD

ORIGINAL

COMMONWEALTH OF AUSTRALIA
PATENTS ACT 1990

PROVISIONAL SPECIFICATION FOR THE INVENTION ENTITLED:

"VEHICLE EXTERNAL MIRROR HOUSING"

This invention is described in the following statement:-

The present invention relates to vehicle mirror housings and in particular to vehicle external mirror housings formed from plastic.

Vehicle external mirror housings have evolved from simple mounting structures for "wing mirrors" to receptacles for mirrors performing many functions and housing a number of components. For instance, mirror housings commonly house servomotors which are capable of rotating mirrors mounted to the housings about two axes so as to enable the driver to adjust his or her field of rear view. Also external mirror housings commonly are pivotable inward towards the vehicle side in the event of a collision with a solid object and, in some circumstances, automatically upon parking the vehicle to reduce the protrusions from the vehicle's side and its maximum width. Furthermore, equipment such as heaters, antennas and lights may also be supported by the modern external mirror housing. External mirror housings must also be shaped so as to minimise wind noise and so as to minimise drag, while providing an aesthetically pleasing external appearance. As a result, mirror housings have become larger, heavier, more complex and therefore more expensive to produce.

To achieve the functionality and performance required at a reasonable cost, vehicle external mirror housings are usually produced in plastic using injection moulding techniques. Typically housings are made from shells of injection moulded plastics having wall thickness in the range of 2 to 3 millimetres. Such a wall thickness has been found to provide adequate strength and rigidity.

Many different mirror housing constructions are known. Mirror housings may be formed by two mating structural components, by one cosmetic component and one structural component, or from a single cosmetic/structural component. However generally, mirror housings are produced from at least two mating components, which, when joined, form a hollow shell. Mating bosses, moulded into the shells are usually provided to facilitate alignment and joining of components. Within the hollow shell is provided a mount to enable connection of the mirror housing to a vehicle bracket, which itself is attached to the side of a vehicle. In order to avoid high stresses within the plastic shell, these mounts must be designed so that they

distribute load away from the mount itself. This becomes increasingly important as the wall thickness of the plastics shell is reduced.

Vehicle external mirror housings are generally made from shells having mounting and connection bosses which add to the complexity of the injection moulding tooling. Furthermore, the injection moulded shells, having a wall thickness of 2 to 3 millimetres take a significant time to cool resulting in a cycle time of about 50 seconds.

Where possible it is desirable to reduce the amount of plastics material used to thereby reduce the cost and weight of the mirror housing.

It is an object of the present invention to provide an improved vehicle external mirror.

It is a further object of the present invention to provide a vehicle external mirror which generally meets the requirements outlined above using a simplified shell design that can be produced with a shorter cycle time.

SUMMARY OF THE INVENTION

According to the present invention, there is provided a housing for a vehicle external mirror comprising a thin external shell substantially filled with foam, said foam securing and supporting said shell.

Preferably said housing further comprises an integral mount adapted to enable attachment of said housing to a vehicle mounted mirror housing bracket. To reduce maximum stresses, preferably said integral mount includes a member which extends inwards from the periphery of said housing into said foam to provide a means for transmitting loads acting on said housing to said integral mount. Preferably the stiffness of said member reduces as it extends away from said integral mount.

Preferably said housing further comprises a mirror mount adapted to support a mirror, said foam also supporting said mirror mount.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT OF THE INVENTION

A preferred embodiment is illustrated in the accompanying representations in which:

Fig 1 shows a vehicle external side mirror housing in cross-section viewed from its rear.

Fig 2 shows the mirror housing of Fig 1 in cross-section viewed from its side. Also shown in this view is a mirror attached to the mirror housing.

Referring to Figs 1 and 2, a vehicle external mirror assembly 10 comprises a vehicle bracket 15 supporting a vehicle external mirror housing 20 which houses a mirror 41.

The external mirror assembly 10 is attached to a vehicle door panel 12 using a mounting plate 16 and screws 17. Connecting vehicle bracket 15 and vehicle external mirror housing 20 is a pivot assembly 30.

Vehicle external mirror housing 20 comprises an outer shell, formed from front shell 22 and rear shell 23, filled with foam 25. Foam 25 acts as a support for the plastic shell components 22 and 23 and secures them together, obviating the need for attachment bosses and connectors. An integral mount is provided in the form of the upper section 30' of pivot assembly 30 and load transmitting member 31.

Mirror mount 35 is partially surrounded by foam 25 as shown in Fig 2. Foam 25 bonds mirror mount 35 to the external mirror housing 20 and rigidly supports it. Mirror 41 is secured within a mirror surround 40 which is connected to mirror mount 35 using a gimbal joint 32. The angle of mirror 41, relative to the mirror housing 20, is adjusted by control rods 33 and 34. The movement of these control rods is typically achieved through the use of servomotors. This mirror mounting and mirror angle

control arrangement is but one of many possible arrangements which can be used within a housing for a vehicle external mirror according to the invention.

The vehicle external mirror assembly 10 shown in Figs 1 and 2 differs from conventional mirrors in that foam 25 and 18 is used to provide a rigid structure and to adhere the various components together. This design enables the shells of both the vehicle bracket 15 and the vehicle external mirror housing 20 to be considerably thinner. Conventional mirror shells are normally between 2 and 3 millimetres thick. In the embodiment shown in Figs 1 and 2 the wall thickness of the shells is approximately 0.7 millimetres. Because the wall thickness is reduced, the amount of plastics material used to produce an external mirror assembly is significantly reduced. Not only does this reduce the cost, it also reduces the weight of the mirror assembly. The foam 18 and 25 used to fill the shells 15', 22 and 23 has adhesive properties which bond to the shells. The bonding property of the foam obviates the need for bosses and connectors between separate components.

While various plastics materials may be used to produce shell components 15', 22 and 23, ABS and Lexan have been found to be effective. The thickness of the plastics material can also be varied. Reduced thickness shells improves cycle times for the injection moulding process and, because the foam 18 and 25 provides structural support for the mirror assembly, the rigidity and strength of the shell is of less importance. Depending on the plastic being used the thin shell will be less than 1.5 millimetres thick and usually in the range of 0.5 to 1 millimetre thick.

Various foams may be used to fill the hollow shells 15, 22 and 23. Polyurethane foams are one example. The foam density, rigidity, strength and adhesion properties can be varied by changing the proportion of resin and other ingredients and by selection of pressures and curing times.

Although not shown in Figs 1 and 2, a film laminate can cover the front shell 22. This film laminate provides an aesthetically pleasing and abrasion resistant finish to the mirror housing. By including a coloured film in the film laminate, the need for

painting the mirror housing is eliminated. An abrasion resistant clear film covers the coloured film and forms the final external layer.

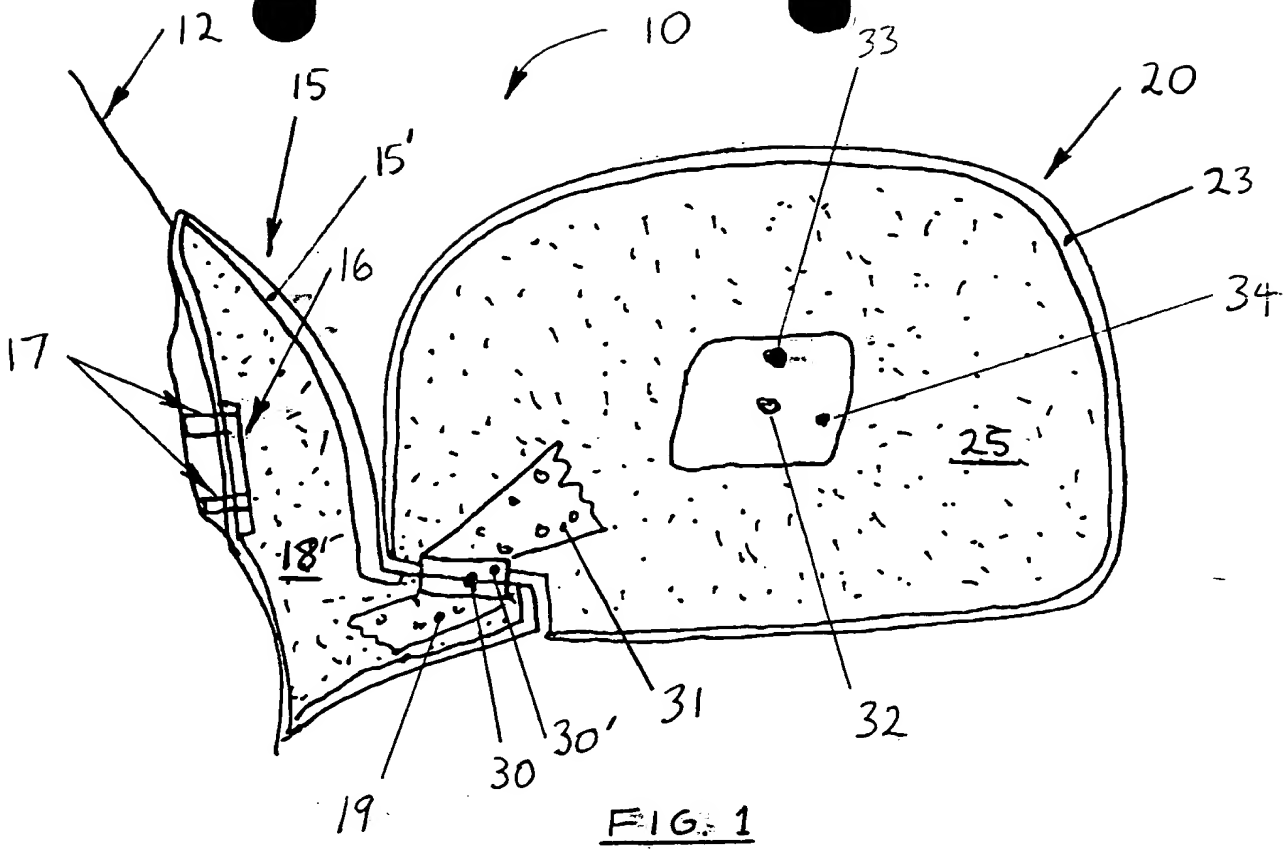
The vehicle external mirror assembly described above and depicted in Figs 1 and 2 is lightweight, rigid and of adequate strength. However the structure is not capable of withstanding high point loads and therefore it is necessary to ensure that the interface between pivot assembly 30 and on one side vehicle bracket 15 and on the other side mirror housing 20 is such that loads are diffused through the structure. Load transmitting members 19 and 31 perform this function. They extend away from pivot assembly 30 deep into the foam thereby distributing forces through the foam structure and reducing the maximum tensile and compressive stresses within the vehicle bracket 15 and external mirror housing 20.

The load transmitting members 19 and 31 are designed so that their stiffness progressively reduces away from their connection points to the pivot assembly 30. This allows loads to be transferred from the relatively flexible foams 18 and 25 to the relatively rigid pivot assembly 30 without developing excessive tensile or compressive stresses. The large surface area of load transmitting members 19 and 31 assist in ensuring a strong load to foams 18 and 25.

While the present invention has been described in terms of a preferred embodiment in order to facilitate better understanding of the invention, it should be appreciated that various modifications can be made without departing from the principles of the invention. Therefore, the invention should be understood to include all such modifications within its scope.

Dated this 5th day of February 1999.

BRITAX RAINSFORDS PTY LTD
By their Patent Attorneys
MADDERNS


12
10
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15'
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17
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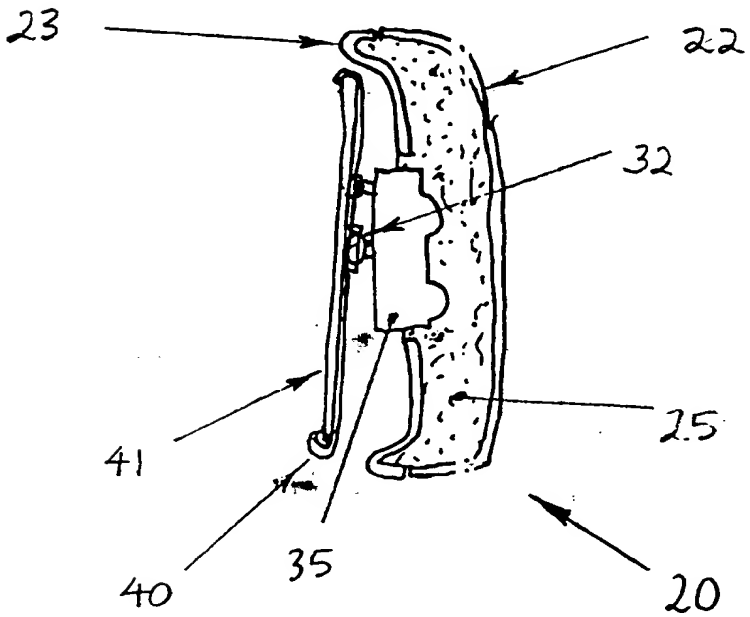
19

FIG. 1


23
22
32
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25
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35
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FIG. 2